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Distribution of orthopteran insects among different habitats in three districts of Madhya Pradesh, India

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ABSTRACT : During the survey in 2009, altogether 398 specimens of Orthoptera belonging to 27 species under 27 genera and 8 families were collected from different localities of Satna, Katni and Damoh districts by the survey team of Zoological Survey of India, Jabalpur. The family Acrididae was found to be the most predominant group of grasshoppers represented by 11 species, followed by the family Tettigoniidae, represented by 4 species and 4 genera. Among the different habitats, grasses supported the highest number of species (17) followed by the Paddy field (8).

Keywords : Orthoptera, Habitats, Madhya Pradesh

INTRODUCTION

The orthopteran insects are almost terrestrial in habitats, found in trees, bushes, and other vegetation, from subterranean burrows and caves to tree tops, and from dense forest to savanna, prairie, and desert, but a few species are aquatic or semi-aquatic. The orthopteran include general scavengers, many voracious herbivorous, and some omnivorous, or at least polyphagous species. Most of the species are active, diurnal (most Caelifera), or nocturnal (many Ensifera) insects. Many species are camouflaged by colouration that resemble the background or foliage. Temperature, rain fall and soil conditions are some important factors, which determine the distribution of the orthopteran insects.

The orthopteran insects feeding on crops and trees are most common biotic constituents of the grazing food chain. Different food chains are often interconnected, e.g. a specific herbivore of one food chain may serve as food of carnivores of several other food chains. These insects are also food for mammals, many birds, reptiles, amphibians and other predators.

Phipps (1970) classified the grasshoppers habitats into 5 principle categories- thicket, woodland, long grass, short grass and cultivation, wherein he found that the species of subfamilies viz. Acridinae, Gomphocerinae, Hemiacridinae and Truxalinae were restricted to grasses and cultivation, while Catantopinae were found in thicket, with a number of species preferring grasses.

The species of superfamily Acridoidea are highly economically important, which cause considerable damage to the crops and vegetable plants or forests. Coleman and Kannan (1911), Pruthi and Nigam (1939), Roonwal (1976), and Mandal *et al.* (1999) have also recorded some species of Acridoidea as a pest of crops and vegetables. *Gastrimargus marmorata* a species from South-east Asia, Assam to West Guinea, damages maize, rice, sorghum, citrus, sugarcanes, cocoa and oil palm (Roffey, 1979).

The major pest of paddy is *Hieroglypus banian* (Fabricius) reported by Bhatia and Mathur (1964). Chowdhury and Majid (1954) reported this pest on rice from Assam. Sengupta and Behura (1960) estimated rice loss ranging from 25 to 95% in different parts of India by this pest. *Hieroglyphus nigrorepletus* is also reported pest of rice, sugar cane, hemp, maize, and sorghum in the Indo-Pakistan (Ghouri and Ahmed, 1960). Roychoudhury *et al.* (2003) reported 5 species of Orthoptera defoliating teak plantation in Madhya Pradesh. Joshi *et al.* (2004) reported 12 species of Orthoptera from various host plants in Kanha National Park, Madhya Pradesh. The studies conducted by Kandibane *et. al.* (2004) also indicated that Acrididae is dominant family in rice ecosystem. Mandal *et. al.* (2007) reported 38 species short-horned grasshoppers as pests of various crops. Recently, Paulraj *et al.* (2009) discussed these insects among the different habitats, where grasses supported the highest number of species in two districts of Tamil Nadu.

The orthopteran insects are the dominant above ground invertebrates in pastures and natural grasslands (Scott *et al.*, 1979; Risser *et al.*, 1981). Orthopteran insects cause significant damage to tree seedlings and agricultural crops (Joshi *et al.*, 1999). On the basis of host preference, Isely (1944) classified these grasshoppers as grass feeders (graminivorous), forb-feeders (forbivorous) or a mix of these two (ambivorous or mixed feeders).

The population decrease and fragmentation of many grasshoppers and katydids is mainly determined by grazing and landscape disturbances (building and road construction, ploughing , irrigation (Sergeev, 1998). In recent years, farmers are changing the cropping pattern and agronomical practices due to urbanization, labour problem and to get more profit from other crops. The changing scenario in agricultural is affecting the primary consumers like grasshoppers and thereby creating an impact on food web. So it is necessary to study the distribution of grasshoppers in relation to their habitats or host plants. Therefore, the present study was undertaken.

MATERIALS AND METHODS

Collection from the various localities of Satna, Katni and Damoh districts of Madhya Pradesh carried out during January 2009 are mentioned below :

Satna : Amarpatan, Chitrakoot, Kusedi, Maihar and Nagod (09^{th} to 12^{th} January, 2009)

Katni : Barhi, Bilhari, Deemerkheda, Tejgarh and Vijayraghavgarh (13^{th} to 17^{th} January, 2009).

Damoh : Bayrama river, Ghatpipariya, Tendukheda, Tejgarh, (18^{th} to 21^{st} January,2009).

Data of these insects feeding on host plants were also collected from grasses, wheat, sugarcane, potato, paddy field, mahua leaves, gram, bamboo, sal, teak, tendu, palasbel, soil etc.

RESULTS AND DISCUSSION

A total of 27 species belonging to 27 genera under 8 families *viz*., Tettigoniidae, Gryllotalpidae, Gryllidae, Oecanthidae, Trigonidiidae, Acrididae, Pyrgomorphidae and Tetrigidae of Orthopteran insects were collected from different host plants and habitats (Table 1).

Family Acrididae was the most dominant among all the collected families in terms of no of individuals (125) 57.60% and total no of species 11 (40.74%). Tettigoniidae was the second largest family with no of individuals (24) 11.06 % and total no of species 4 (14.81%).

The family Acrididae collected from 8 different habitats such as wheat, gram, sugarcane, paddy, soil, grass, sal, mahua plants etc. is well adapted for colonizing in different habitats and to utilize a wide range of host plant materials as their feed. Among the different habitats, grasses were found to be the most preferred habitats for 17 species (24.67%). According to Bernays & Chapman (1978) secondary plant chemicals are largely absent from grasses and hence the gramnivorous grasshoppers escape from the action of secondary plant metabolites. Next to grasslands, more number of grasshoppers (9 species: 13.04%)) was collected from paddy field, followed by the sugarcane with 8 species (11.59%) and wheat crops fields with 7 species (10.14%). In this study, 8 species were collected from single host plant, 10 species were collected from two host plants, 7 species were collected from 3 host plants and 2 species were collected from 5 host plants (Table 2).

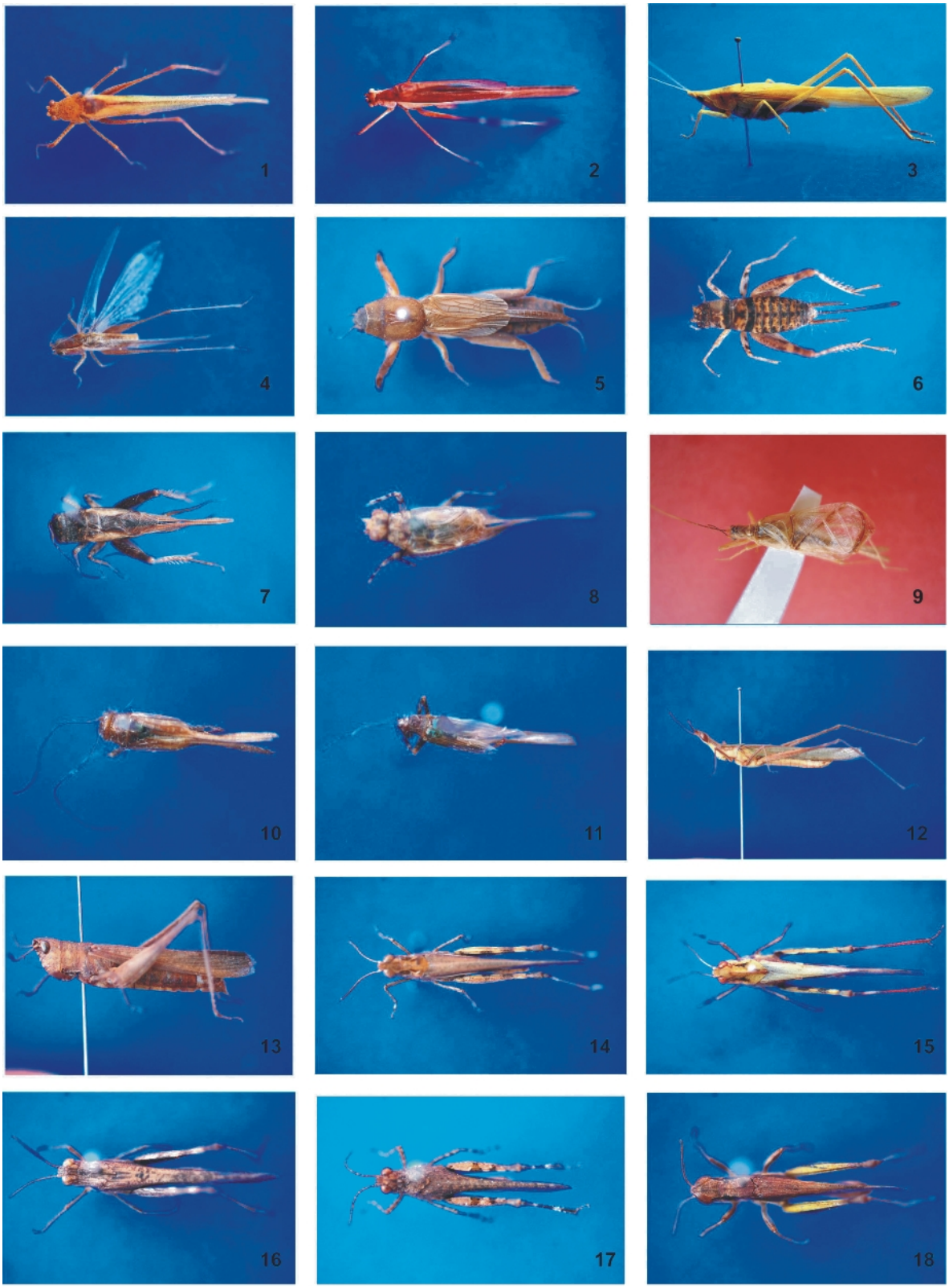
Table 1 : The orthopteran insects collected from different habitats in three districts of Madhya Pradesh

S./Fig. No.	Family/Species	Districts	Habitats	Pests
	1. Tettigoniidae			
1.	*Letana intermedia* Ingrisch, 1990	Satna and Damoh	Grass, Paddy, Wheat	
2.	*Phaneroptera* sp.	Katni and Damoh	Grass, Paddy	
3.	*Euconocephalus incertus* (Walker, 1869)	Katni	Grass, Palasbel	
4.	*Conocephalus maculatus* (Le Guillou, 1841) Family Gryllotalpidae	Satna, Katni and Damoh	Grass, Paddy	
5.	*Gryllotalpa africana* Beauvois, 1805 Family Gryllidae	Satna and Damoh	Soil	Potato, Paddy, Tea
6.	*Gryllodes sigillatus* (Walker, 1869)	Satna and Damoh	Soil	
7.	*Modicogryllus confirmatus* (Walker, 1859)	Satna and Damoh	Soil	
8.	*Pteronemobius fascipes* (Walker, 1869)	Satna	Grass	
	2. Oecanthidae			
9.	*Oecanthus indicus* Saussure, 1878	Satna	Palasbel	
	3. Trigonidiidae			
10.	*Anaxipha* sp.	Katni	Riparian area	
11.	*Trigonidium* sp.	Satna, Katni and Damoh	Riparian area	
	4. Acrididae			
12.	*Acrida exaltata* (Walker, 1859)	Katni and Damoh	Grass, Paddy, Wheat, Gram, Sal	Paddy, Maize, Oat, Wheat and vegetable likes Brinjal, Tomato.

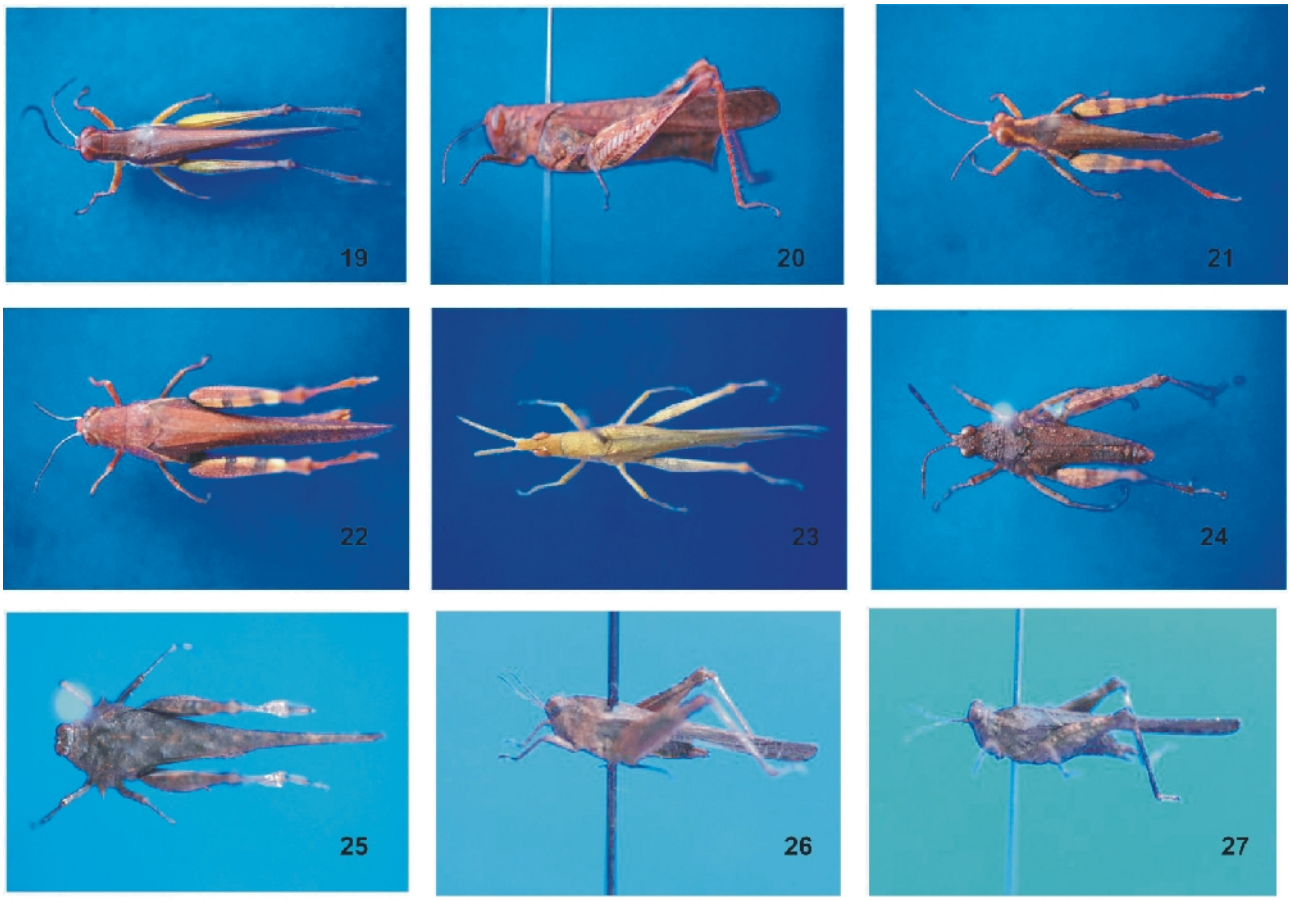
S./Fig. No.	Family/Species	Districts	Habitats	Pests
13.	*Phlaeoba panteli* Bolivar, 1902	Damoh	Paddy, Wheat	
14.	*Aiolopus thalassinus tamulus* (Fabricius, 1798)	Katni and Damoh	Gram, Grass, Sugarcane	Paddy, Maize, Oat, Wheat, Sorghum, Cow pea, Vegetable like, Brinjal, Milch, Lady's finger
15.	*Gastrimargus africanus africanus* (Saussure, 1888)	Katni and Damoh	Sugarcane, Grass, Wheat	Wheat, Oat, Cow pea,
16.	*Morphacris fasciata sulcata* (Thunberg, 1815)	Katni and Damoh	Soil, Paddy	
17.	*Trilophidia annulata* (Thunberg, 1815)	Satna, Katni and Damoh	Gram, Paddy, Grass	Paddy, Cow pea
18.	*Spathosternum prasiniferum prasiniferum* (Walker, 1871)	Satna, Katni and Damoh	Gram, Wheat, Sugarcane, Paddy, Grass	Paddy, Maize, Wheat, Millet, Oat, Brinjal, Tomato etc.
19.	*Oxya hyla hyla* Serville, 1831	Satna, Katni and Damoh	Gram, Grass, Sugarcane	Paddy, Maize, Milch, Cowpea, Wheat, Oat, Millet, Lady's finger, Cabbage, Leaf of cauliflower and Pulse Plants.
20.	*Eucoptacra saturata* (Walker, 1870)	Satna and Damoh	Sugarcane, Grass	
21.	*Xenocatantops humilis humilis* (Serville, 1839)	Satna, Katni and Damoh	Sugarcane, Paddy, Grass	Paddy, Maize, Oat, Cowpea
22.	*Catantops pinguis innotabilis* (Walker, 1870)	Katni and Damoh	Sugarcane, Mahua.	
	5. Pyrgomorphidae			
23.	*Atractomorpha crenulata* (Fabricius, 1793)	Satna, Katni and Damoh	Wheat, Grass	Paddy, Maize, Bengalgram, Millet, Oat, Cow pea, Jute, Tobacco, Wheat
24.	*Chrotogonus* (*Chrotogonus*) *trachypterus trachypterus* (Blanchard, 1836)	Katni and Damoh	Wheat, soil and Bamboo	Cotton, Sorghum, Maize, Wheat, Groundnut Tobacco
	6. Tetrigidae			
25.	*Euscelimena harpago* (Serville, 1839)	Katni	Grass	
26.	*Hedotettix gracilis* (de Haan, 1842)	Satna, Katni and Damoh	Grass, Riparian area	
27.	*Ergatettix dorsifera* (Walker, 1871)	Satna, Katni and Damoh	Grass, Riparian area	

Table 2 : The orthopteran insects collected from different habitats.

Habitats	Number of species	Percent of species
Grass	17	24.63
Paddy	9	13.04
Sugarcane	8	11.59
Wheat	7	10.14
Gram	5	7.24
Tendu	4	5.79
Riparian area	4	5.79
Soil	4	5.79
Teak	3	4.34
Sal	2	2.89
Potato	2	2.89
Bamboo	2	2.89
Mahua	1	1.44
Palas bel	1	1.44
Total	**69**	**100**



Figs. 1-18. 1. *Letana intermedia*, Ingrisch, 2. *Phaneroptera* sp., 3. *Euconocephalus incertus* (Walker), 4. *Conocephalus maculatus* (Le Guillou), 5. *Gryllotalpa africana* Beauvois, 6. *Gryllodes sigillatus* (Walker), 7. *Modicogryllus confirmatus* (Walker), 8. *Pteronemobius fascipes* (Walker), 9. *Oecanthus indicus* Saussure, 10. *Anaxipha* sp., 11. *Trigonidum* sp., 12. *Acrida exaltata* (Walker), 13. *Phlaeoba panteli* Boliver, 14. *Aiolopus thalassinus tamulus* (Fabricius), 15. *Gastrimargus africanus africanus* (Saussure), 16. *Morhphacris fasciata sulcata* (Thunberg), 17. *Trilophidia annulata* (Thunberg), 18. *Spathosternum prasiniferum prasiniferum* (Walker).



Figs. 19-27. 19. *Oxya hyla hyla* Serville, 20. *Eucoptacra saturata* (Walker), 21. *Xenthocatantops humilis humilis* (Serville), 22. *Catantops pinguis innotabilis* (Walker), 23. *Atractomopha crenulata* (Fabricius), 24. *Chrotogonus* (*Chrotogonus*) *trachypterus trachypterus* (Blanchard), 25. *Euscelimena harpago* (Serville), 26. *Hedotettix gracilis* (de Haan), 27. *Ergatettix dorsifera* (Walker).

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